View metadata, citation and similar papers at core.ac.uk

brought to you by CORE

provided by Research Online

UNIVERSITY
OF WOLLONGONG
AUSTRALIA

University of Wollongong
Research Online

Illawarra Health and Medical Research Institute

Faculty of Science, Medicine and Health

2018

Child care centre adherence to infant physical activity and screen time recommendations in Australia, Canada and the United States: An observational study

Lyndel Hewitt
University of Wollongong, llh966@uowmail.edu.au

Sara Benjamin-Neelon
Johns Hopkins University, sara.neelon@jhu.edu

Valerie Carson
University of Alberta, vlcarson@ualberta.ca

Rebecca M. Stanley
University of Wollongong, rstanley@uow.edu.au

Ian Janssen
Queen's University, ian.janssen@queensu.ca

See next page for additional authors

Publication Details

Hewitt, L., Benjamin-Neelon, S. E., Carson, V., Stanley, R. M., Janssen, I. & Okely, A. D. (2018). Child care centre adherence to infant physical activity and screen time recommendations in Australia, Canada and the United States: An observational study. Infant Behavior and Development, 50 88-97.

Research Online is the open access institutional repository for the University of Wollongong. For further information contact the UOW Library: research-pubs@uow.edu.au

Child care centre adherence to infant physical activity and screen time recommendations in Australia, Canada and the United States: An observational study

Abstract

Objective: The aim of this study was to compare adherence to physical activity and sedentary behaviour recommendations within the 2011 Institute of Medicine Early Childhood Obesity Prevention Policies as well as screen time recommendations from the 2013 American Academy of Pediatrics for samples of infants in child care centres in Australia, Canada, and the United States (US).

Methods: This cross-sectional study used data from: the Australian 2013 Standing Preschools (N = 9) and the 2014-2017 Early Start Baseline (N = 22) studies; the 2011 Canadian Healthy Living Habits in Pre-School Children study (N = 14); and the American 2008 (N = 31) and 2013-2017 (N = 31) Baby Nutrition and Physical Activity Self-Assessment for Child Care (NAP SACC) trials. Data were compared on the above infant recommendations. Percentages were used to describe compliance to the recommendations and chi-square tests to determine whether compliance differed by country.

Results: Child care centres were most compliant (74%-95%) with recommendations to: provide daily indoor opportunities for infants to move freely under adult supervision, daily tummy time for infants less than 6 months of age, indoor and outdoor recreation areas that encourage infants to be physically active, and discourage screen time. Centres were least compliant (38%-41%) with adhering to recommendations to: limit the use of equipment that restricts an infant's movement and provide education about physical activity to families. Compared with Canadian and US centres, Australian centres were less compliant (46%) with the recommendation to engage with infants on the ground each day, to optimize adult-infant interactions and to limit the use of equipment that restricts the infant's movement. Canadian centres were less compliant (39%) with the recommendation to provide training to staff and education to parents about children's physical activity. US centres were less compliant (25%-41%) with the recommendations to provide daily opportunities for infants to explore their outdoor environment, limit the use of equipment that restricts the infant's movement and provide education to families about children's physical activity.

Conclusions: Assisting child care centres on limiting the use of equipment that restricts an infant's movement, and providing education about children's physical activity to families may be important targets for future interventions.

Disciplines

Medicine and Health Sciences

Publication Details

Hewitt, L., Benjamin-Neelon, S. E., Carson, V., Stanley, R. M., Janssen, I. & Okely, A. D. (2018). Child care centre adherence to infant physical activity and screen time recommendations in Australia, Canada and the United States: An observational study. Infant Behavior and Development, 50 88-97.

This journal article is available at Research Online: http://ro.uow.edu.au/ihmri/1192

Authors
Lyndel Hewitt, Sara Benjamin-Neelon, Valerie Carson, Rebecca M. Stanley, Ian Janssen, and Anthony D. Okely

This journal article is available at Research Online: http://ro.uow.edu.au/ihmri/1192

Child care centre adherence to infant physical activity and screen time recommendations in Australia, Canada and the United States: An observational study

Lyndel Hewitt[1,5], Sara E. Benjamin-Neelon[2], Valerie Carson[3], Rebecca M. Stanley[1,5], Ian Janssen[4], Anthony D. Okely[1,5]

Main Affiliations:

[1] Early Start, Faculty of Social Sciences, University of Wollongong, Wollongong, New South Wales, Australia, 2522, Australia. Email: Lyndel Hewitt, llh966@uowmail.edu.au; Email: Dr Rebecca Stanley, rstanley@uow.edu.au. Email: Professor Anthony Okely, tokely@uow.edu.au

[2] Department of Health, Behavior and Society, Johns Hopkins University, Baltimore, MD, USA. Email: Associate Professor Sara Benjamin-Neelon, sara.neelon@jhu.edu

[3] Faculty of Kinesiology, Sport and Recreation, University of Alberta, Edmonton, AB, T6G 2H9, Canada. Email: Associate Professor Valerie Carson, vlcarson@ualberta.ca

[4] School of Kinesiology and Health Studies, Queen's University, Kingston, ON, K7L 3N6, Canada. Email: Professor Ian Janssen, ian.janssen@queensu.ca

[5]Illawarra Health and Medical Research Institute, Wollongong, NSW, Australia, 2522

Corresponding Author:

Lyndel Hewitt
Early Start
Faculty of Social Sciences
University of Wollongong

Wollongong, NSW, Australia, 2500
E-mail: llh966@uowmail.edu.au

Journal word count limit: 5000

Current word count: 2911

Abstract

Objective

The aim of this study was to compare adherence to physical activity and sedentary behavior recommendations within the 2011 Institute of Medicine Early Childhood Obesity Prevention Policies as well as screen time recommendations from the 2013 American Academy of Pediatrics for samples of infants in child care centres in Australia, Canada, and the United States (US).

Methods

This cross-sectional study used data from: the Australian 2013 Standing Preschools (N = 9) and the 2014-2017 Early Start Baseline (N=22) studies; the 2011 Canadian Healthy Living Habits in Pre-School Children study (N=14); and the American 2008 (N=31) and 2013-2017 (N=31) Baby Nutrition and Physical Activity Self-Assessment for Child Care (NAP SACC) trials. Data were compared on the above infant recommendations. Percentages were used to describe compliance to the recommendations and chi-square tests to determine whether compliance differed by country.

Results

Child care centres were most compliant (74%-95%) with recommendations to: provide daily indoor opportunities for infants to move freely under adult supervision, daily tummy time for infants less than 6 months of age, indoor and outdoor recreation

areas that encourage infants to be physically active, and discourage screen time. Centres were least compliant (38%-41%) with adhering to recommendations to: limit the use of equipment that restricts an infant's movement and provide education about physical activity to families. Compared with Canadian and US centres, Australian centres were less compliant (46%) with the recommendation to engage with infants on the ground each day, to optimize adult-infant interactions and to limit the use of equipment that restricts the infant's movement. Canadian centres were less compliant (39%) with the recommendation to provide training to staff and education to parents about children's physical activity. US centres were less compliant (25%-41%) with the recommendations to provide daily opportunities for infants to explore their outdoor environment, limit the use of equipment that restricts the infant's movement and provide education to families about children's physical activity.

Conclusions

Assisting child care centres on limiting the use of equipment that restricts an infant's movement, and providing education about children's physical activity to families may be important targets for future interventions.

Keywords: Child care, Infant, Obesity, Recommendation, Physical activity, Screen time, Tummy time

Baby NAP SACC Clinical Trials Registration (ClinicalTrials.gov registry): NCT01890681. Registered 27 June 2013.

Background

The global prevalence of 0- to 5-year-old children who are overweight or obese has increased from 4.2% in 1990 to 7.8% in 2015 and this trend is expected to continue to rise to 9.1% by 2020 [1]. For developed countries such as the United Kingdom, United States, Canada, Australia, New Zealand and Japan, the prevalence is even higher. In 1990, 7.9% of children aged 0–5 years in these countries were overweight or obese; this rose to 12.9% in 2015 and is expected to reach 14.1% by 2020 [1]. The early years are strongly predictive of obesity in later childhood and subsequently adulthood [2]. It is also well known that excess weight in infancy is associated with delayed gross motor development [3], and leads to other adverse health outcomes, such as coronary heart disease in adulthood [4]. Therefore, the early years provide an important opportunity for obesity prevention [5].

A moderate proportion of very young children attend formal child care across developed countries. For instance, the Longitudinal Study of Australian Children (LSAC) reported that 35% of parents used regular child care for their infants [6]. Likewise, 17% of American children aged birth to 2 years are in some type of formal child care, [7] and 54% of Canadian children from 6 months to 5 years are cared for in some type of non-parental care [8]. Recent evidence has shown attending child care in the first year of life was associated with slightly higher weight at 12 months of age [9]. With a large number of infants attending such settings, there is a need to understand the factors contributing to obesity prevention while in these environments and review child care practices in the first 12 months of life.

To assist in the prevention of obesity in infancy and early childhood, in 2011 the National Academy of Medicine, previously known as the Institute of Medicine,

104 published recommendations aimed at promoting healthy environments in child care
105 settings [10]. These recommendations provide guidance on appropriate quantities and
106 types of physical activity, sleep, and sedentary behaviour. In addition, as the use of
107 recreational electronic media plays an important role in the development of childhood
108 obesity [11], in 2013 The American Academy of Pediatrics published updated
109 recommendations on the use of television and other entertainment media for infants
110 and young children [11, 12].
111
112 To our knowledge, there are no studies examining adherence to infant physical
113 activity and screen time recommendations in formal child care settings. Such data
114 may assist to identify child care practices in the first 12 months of life which impact
115 the development of obesity. The purpose of this study was to examine the adherence
116 of child care centres to these infant recommendations using data from three developed
117 countries.
118
119 **Methods**
120 ***Overview***
121 For this observational study, data were collected from the 2013 Standing Preschools
122 (N=9) and the 2014 - 2017 Early Start Baseline (N=22) studies in Australia, the 2011
123 Healthy Living Habits in Pre-school Children study (N=14) in Canada and the 2008
124 (N=31) and 2013 - 2017 (N=31) Baby Nutrition and Physical Activity Self-
125 Assessment for Child Care (Baby NAP SACC) trials in the US. Since this study
126 conducted secondary analyses using existing centre-level data and did not involve
127 interaction with any human subjects, ethical approval was not required; each
128 individual study had its own ethical approval. This study, however, followed the

guidelines in the Strengthening the Reporting of Observational studies in Epidemiology (STROBE) statement [13].

National Academy of Medicine and American Academy of Pediatrics recommendations

The four recommendations from the National Academy of Medicine and one from the American Academy of Pediatrics regarding healthy and appropriate physical activity and screen time practices for infants attending child care centres are reported in Table 1.

Recommendations review

The questions and response option criteria from each country's child care centre questionnaire that best reflected the recommendations were used from each study. For example, to meet the criteria for "Does this child care centre limit the use of equipment such as strollers, swings, and bouncer seats/chairs for holding infants while they are awake?", participants needed to answer "Rarely or Never". To meet the criteria, "Are early childhood educators trained in ways to encourage physical activity and decrease sedentary behavior in young children through certification and continuing education?", participants needed to answer they were receiving professional development at least 1-2 times per year. A complete list of each country's question and the criteria required to meet the recommendation is in Table 2.

Analysis

The percentage of child care centres that were compliant with the recommendations as outlined in Table 2 were calculated. Pearson chi-square tests were used to assess

whether compliance differed across countries. Missing data (average overall 8%) were not included in the analysis. Analyses were conducted using SPSS version 21 (IBM Corp, Armonk, NY, USA). The statistical significance was set to $p<0.05$. Socio-economic status (SES) was assessed in Australia, Canada and the United States using Socio-economic Indexes for Areas (SEIFA) [14], neighbourhood SES (education, income, unemployment rate from 2006 Canadian census data in PCensus for MapPoint through ArcGIS software) and household income [15], respectively. The area where the child care centre was located was defined as urban (>50 000 population) or non-urban (<50 000 population) (Table 4) [16].

Results

The final sample included 107 child care centres with 31 from Australia, 14 from Canada, and 62 from the United States. Almost all surveys (95%) were completed by the director of the child care centre. Centre opening and closing hours ranged from 6:30 am to 12:00 midnight, the average number of infants per centre was 10, and the year the child care centre started operating ranged from 1969 to 2014. Almost all staff (94%) had a diploma, certificate or degree in child care.

Most child care centres provided daily opportunities for infants to explore their indoor environments, provided them with tummy time, had suitable indoor and outdoor recreation areas and discouraged screen media exposure (Table 3). One third limited the use of equipment that restricted the infant's movement whilst they were awake and provided education to families about children's physical activity.

Significant differences ($p<0.05$) were found between countries for compliance to the following seven recommendations: daily opportunities for infants to move freely under adult supervision to explore their indoor environment; daily opportunities for infants to move freely under adult supervision to explore their outdoor environment; staff who provide daily 'tummy time' for infants less than 6 months of age; indoor recreation areas that encourage infants to be physically active; limiting the use of equipment for holding infants whilst they are awake; staff training in ways to increase children's physical activity; and education to families about children's physical activity.

When compared to the sample of child care centres in Canada and the United States, the Australian sample had the greatest non-compliance to the discouragement of screen media exposure and staff engaging with infants on the ground. On a positive note, the sample of child care centres from Australia had the greatest compliance to providing education to families regarding physical activity for infants and staff training on ways to increase infants' physical activity.

The greatest compliance from the sample of Canadian child care centres was in providing daily opportunities for infants to explore their outdoor environment, and this was closely followed by the provision of a suitable outdoor recreation area. However, only 39% of these centres provided staff training and education to families regarding infants' physical activity.

The sample from the United States complied mostly with the provision of an outdoor recreation area suitable for infants and providing daily tummy time. In contrast, only

one fifth of the centres limited the use of equipment that restricts an infant's movement and provided education regarding infants' physical activity to families.

Discussion

Prior to this study there was limited evidence about the extent to which infant physical activity and screen time recommendations were adhered to in child care centres. Reporting these data may assist with providing recommendations regarding future research to increase physical activity, prevent sedentary behaviour, and decrease media exposure in infants. Based on the findings from this study, potential targets would be limiting the use of equipment that restricts infant's movement and strategies for educating families on children's physical activity.

There were some significant variations between samples from the different countries. For example**,** the conclusion that the sampled child care centres need to improve their education to families regarding physical activity applies more to the Canadian and United States samples than it does to the Australian sample. This could potentially be explained by the introduction of the Early Years Learning Framework where learning outcomes are actively promoted in Australian child care settings, in collaboration with families [17]. In addition, improving the number of opportunities for infants to move freely under adult supervision to explore their outdoor environment and the provision of an indoor recreation space that encourages infants to be physically active applies more to the United States than it does to Canada or Australia.

Some of the messages regarding physical activity provision to infants in child care settings is being adhered to. In this study, approximately two thirds of the sampled

child care centres met the recommendations to provide suitable indoor and outdoor recreation areas, indoor play, daily tummy time and no screen time to the infants in their care. However, there are still a number of areas where further improvement is possible including time spent in outdoor play, playing on the ground, limiting restrictive equipment and educating families and staff regarding physical activity. To address these areas that require improvement, infant child care curriculum may need to be reviewed to ensure they meet the national physical activity and sedentary behaviour guidelines [18, 19]. It has been suggested that infants may experience prolonged periods of inactivity in a crib or high chair due to staff needing to care for other children [9]. Further training and a review of staff-to-infant ratios could possibly be other important areas to target for future research to ensure staff are equipped to limit the use of equipment that restricts infants' movement while they are awake.

There were some limitations to this study. Overall, missing data ranged from 4% to 11.5% per question. Sample sizes were small and differed between countries ranging from 14 in Canada to 62 in the United States. This potentially could have skewed results, favoring a particular country over another. The US data contributed four times as much to the overall results than the Canadian data and twice as much as the Australian data. Retrospective self-reporting questionnaires were used which may present a response bias. It would have been preferable to assess compliance with the recommendations by direct observation using an independent observer. The National Academy of Medicine recommendations became available in 2011 and the AAP recommendations in 2013. Some data were collected prior to this time. As such, child care centres providing this data may have now changed practice according to the published recommendations. However, additional analyses were conducted removing

the United States 2008 sample. The results were very similar, limiting the use of equipment and providing education to families remained the two recommendations where compliance was the least adhered to both overall and in the most recent US sample alone. Alarmingly, the adherence to the no screen time policy dropped from 84% with the 2008 US sample included to 68% in the 2013-2017 US sample alone and from 80% overall to 71% overall. This may be due to the availability of i-Pads and other tablets in the 2011-2017 data sample and not in the 2008 sample. The same seven recommendations had the same significant differences between countries and the recommendations that were the adhered to the most were the same. Previous cross-sectional research has investigated state regulations related to the promotion of physical activity among infants in child care centres [20]. It found that physical activity regulations differed amongst and within states. In this study, Australian child care centres were from the state of New South Wales, Canada from the Province of Alberta and the United States from Massachusetts and North Carolina. As such, this study provides a snapshot of a small proportion of the child care centres in these states/provinces and may not be generalizable to the other parts of these countries. In addition, samples are not representative of that country and as such, cannot be applied to represent the entire country. Another important issue is for some of the recommendations, different questions were used to assess adherence (Table 2). The recommendation regarding engaging with infants on the ground each day to optimize adult-infant interactions is a good example of this and may explain why the Australian sample did so poorly relative to the Canadian sample.

Conclusions

Promoting physical activity and reducing screen time should commence in the infant stage of life. Within this study, many child care centres were able to provide suitable indoor and outdoor recreation areas and daily indoor opportunities to encourage physical activity, provide tummy time and avoid screen media exposure to the infants in their care. Potential areas of improvement for future interventions to target include, limiting the use of equipment that restricts the infant's movement whilst they are awake and providing education to staff and families about children's physical activity.

List of abbreviations

IOM: Institute of Medicine; AAP: American Academy of Pediatrics; US: United States; LSAC: Longitudinal Study of Australian Children; NAP SACC: Nutrition and Physical Activity Self-Assessment for Child Care; STROBE: Strengthening the Reporting of Observational Studies in Epidemiology; SPSS: Statistical Package for the Social Sciences; IBM: International Business Machines; Corp: Corporation; NY: New York; US: United States; SES: Socio-economic status; SEIFA: Socio-economic Indexes for Areas.

Declarations

Ethics approval and consent to participate

Since this study conducted secondary analyses using existing centre-level data and did not involve interaction with any human subjects, ethical approval was not required; each individual study had its own ethical approval.

Consent for publication

Not applicable

Availability of data and material

The data that support the findings of this study are available from the University of Wollongong, Duke University Medical Centre, and Queen's University; however, restrictions apply to the availability of these data, which were used under license for the current study, and so are not publicly available. Data are however available from the authors upon reasonable request and with permission of the Universities mentioned above.

Competing interests

The authors declare that they have no competing interests

Funding

This research has been conducted with the support of the Australian Government Research Training Program Scholarship awarded to LH. VC is supported by a Canadian Institutes of Health Research (CIHR) New Investigator Salary Award. The Baby NAP SACC intervention was funded by grants from the National Institutes of Health (R01DK093838 and F32DK080618).

Authors' contributions

LH analyzed and interpreted the data and drafted the manuscript. ADO conceived of the study. LH, SEBN, VC, RMS and ADO contributed to defining how each recommendation was met. All authors revised the manuscript, read and approved the final version.

Acknowledgements

We are thankful to the data collectors and participants from the Australian Early Start Baseline and Standing Preschools Project, the Canadian Healthy Living Habits in Pre-school Children study and the United States Baby NAP SACC trials.

References

1. de Onis, M.M., *Global prevalence and trends of overweight and obesity among preschool children.* The American journal of clinical nutrition, 2010. **92**(5): p. 1257-1264.
2. Ong, K. and R. Loos, *Rapid infancy weight gain and subsequent obesity: Systematic reviews and hopeful suggestions.* Acta Paediatrica, International Journal of Paediatrics, 2006. **95**(8): p. 904-908.
3. Slining, M., et al., *Infant Overweight Is Associated with Delayed Motor Development.* Journal of Pediatrics, 2010. **157**(1).
4. Must, A., et al., *Long-term morbidity and mortality of overweight adolescents: A follow-up of the Harvard Growth Study of 1922 to 1935.* New England Journal of Medicine, 1992. **327**(19): p. 1350-1355.
5. Campbell, K.J., et al., *The extended Infant Feeding, Activity and Nutrition Trial (InFANT Extend) Program: A cluster-randomized controlled trial of an early intervention to prevent childhood obesity Energy balance-related behaviors.* BMC Public Health, 2016. **16**(1).
6. Harrison, L.J., et al., *Child care and early education in australia-the longitudinal study of australian children.* 2010.
7. Blaine, R.E., et al., *Child care provider adherence to infant and toddler feeding recommendations: Findings from the baby nutrition and physical activity self-assessment for child care (baby NAP SACC) study.* Childhood Obesity, 2015. **11**(3): p. 304-313.
8. Hinkley, T., V. Carson, and K.D. Hesketh, *Physical environments, policies and practices for physical activity and screen-based sedentary behaviour among preschoolers within child care centres in Melbourne, Australia and Kingston, Canada.* Child: Care, Health and Development, 2015. **41**(1): p. 132-138.
9. Benjamin Neelon, S.E., et al., *Early child care and obesity at 12 months of age in the Danish National Birth Cohort.* International Journal of Obesity, 2015. **39**(1): p. 33-38.
10. *Institute of Medicine: Early Childhood Obesity Prevention Policies.* Washington DC: National Academy of Science, 2011.
11. Strasburger, V.C., et al., *Policy statement - Children, adolescents, obesity, and the media.* Pediatrics, 2011. **128**(1): p. 201-208.
12. Strasburger, V.C. and M.J. Hogan, *Children, adolescents, and the media.* Pediatrics, 2013. **132**(5): p. 958-961.

13. Von Elm, E., et al., *The Strengthening the Reporting of Observational Studies in Epidemiology [STROBE] statement: guidelines for reporting observational studies.* Gaceta Sanitaria, 2008. **22**(2): p. 144-150.
14. Australian Bureau of Statistics, *Census of Population and Housing: Socio-Economic Indexes for Areas (SEIFA).* Australian Bureau of Statistics, Canberra, Australia, 2011.
15. Blaine, R.E., et al., *Child Care Provider Adherence to Infant and Toddler Feeding Recommendations: Findings from the Baby Nutrition and Physical Activity Self-Assessment for Child Care (Baby NAP SACC) Study.* Childhood Obesity, 2015. **11**(3): p. 304-313.
16. United States Census Bureau. *2010 Census Urban and Rural Classification and Urban Area Criteria*. Available from: http://www.census.gov.
17. Australian Government Department of Education, E.a.W.R., *Belonging, Being and Becoming: the Early Years Learning Framework for Australia.* Canberra: Commonwealth of Australia, 2009.
18. Tremblay, M.S., et al., *Canadian physical activity guidelines for the early years (aged 0-4 years).* Applied Physiology, Nutrition and Metabolism, 2012. **37**(2): p. 345-356.
19. Tremblay, M.S., et al., *Canadian sedentary behaviour guidelines for the early years (aged 0-4 years).* Applied Physiology, Nutrition and Metabolism, 2012. **37**(2): p. 370-380.
20. Slining, M.M., S.E.B. Neelon, and K.J. Duffey, *A review of state regulations to promote infant physical activity in child care.* International Journal of Behavioral Nutrition and Physical Activity, 2014. **11**(1).
21. Brown, A., et al., *Media use by children younger than 2 years.* Pediatrics, 2011. **128**(5): p. 1040-1045.

400 **Table 1. 2011 IOM* physical activity [10] and 2013 AAP screen time**
401 **recommendations [21]**
402

IOM* recommendation number	Description of recommendation	Potential actions for infants
3.1	"Child care regulatory agencies should require child care providers and early childhood educators to provide infants, toddlers, and preschool children with opportunities to be physically active throughout the day"	1) Providing daily opportunities for infants to move freely under adult supervision to explore their indoor and outdoor environments 2) Engaging with infants on the ground each day to optimize adult-infant interactions 3) Providing daily "tummy time" (time in the prone position) for infants less than six months of age.
3.2	"The community and its built environment should promote physical activity for children from birth to age five"	1) To ensure that indoor and outdoor recreation areas encourage all children, including infants, to be physically active.
3.3	"Child care regulatory agencies should require child care providers and early childhood educators to allow infants, toddlers, and preschoolers to move freely by limiting the use of equipment that restricts infants' movement and by implementing appropriate strategies to ensure that the amount of time toddlers and preschoolers spend sitting or standing still is limited"	1) Using cribs, car seats, and high chairs for their primary purpose only – cribs for sleeping, car seats for vehicle travel, and high chairs for eating 2) Limiting the use of equipment such as strollers, swings, and bouncer seats/chairs for holding infants while they are awake.
3.4	"Health and education professionals providing guidance to parents of young children and those working with young children should be trained in ways to increase children's physical activity and decrease their sedentary behavior, and in how to counsel parents about their children's physical activity"	1) Child care regulatory agencies requiring child care providers and early childhood educators to be trained in ways to encourage physical activity and decrease sedentary behaviour in young children through certification and continuing education.
AAP recommendation	**Description**	**Potential actions for infants**
2013	**"**Screen media exposure should be discouraged for children under 2 years of age"	No screen media exposure for infants

403 *IOM, from 2015, known as the National Academy of Medicine
404

405 **Table 2. Corresponding question and criteria required from each country's**
406 **survey for the child care centre's response to meet the infant recommendations**

	Question	Early Start Baseline[a]		Standing Preschools Project[b]		Healthy Living Habits in Pre-school Children study[c]		Baby NAP SACC (2008)[d]		Baby NAP SACC (2013-2017)[e]	
	Did the centre provide…	**Survey question**	**Response needed to meet recommendation**	**Survey question**	**Response needed to meet recommendation**	**Survey question**	**Response needed to meet recommendation**	**Survey question**	**Response needed to meet recommendation**	**Survey question**	**Response needed to meet recommendation**
INDOOR	Daily opportunities for infants to move freely under adult supervision to explore their indoor environment? (IOM Rec 3.1)	Our program offers the following features in the indoor play space	2 to 4 features	Our program offers the following features in the indoor play space	2 to 4 features	Indoor active play time is provided to all children: Infants	120 to 180 minutes or more each day	Opportunities for moving around within the classroom is provided for all infants	1, several or at all times per day	Our program provides structured active play (teacher-led activity that occurs indoors or outdoors) each day: To infants	Always
OUTDOOR	Daily opportunities for infants to move freely under adult supervision to explore their outdoor environment? (IOM Rec 3.1)	Infants are taken outdoors	1 to 2 times per day or more	Infants are taken outdoors	1 to 2 times per day or more	On average, how may minutes are spent in outdoor active play time per day in the fall, winter, spring, summer	>60 minutes	Outdoor time is provided for all infants	Everyday	Children are taken outdoors: Infants	1 time per day or more
GROUND	Staff who engage with infants on the ground each day to optimize adult-infant interactions? (IOM Rec 3.1)	During tummy time and other activities, teachers interact with infants to help them build motor skills	Always	During tummy time and other activities, teachers interact with infants to help them build motor skills	Always	Formal instruction or teaching of gross motor skills (indoor or outdoor) is provided to all children: Infants	1 to 3 or more times per day	Staff engage with infants to encourage development of gross motor skills (reaching, sitting, standing, crawling, walking)	All of the time	During floor play, teachers get on the ground with infants:	Always
TUMMY TIME	Staff who provide daily 'tummy time' for infants less than 6 months of age? (IOM Rec 3.1)	Our program offers 3-5 minutes of tummy time to infants	1 to 2 times per day	Our program offers 3-5 minutes of tummy time to infants	1 to 2 times per day	No suitable question	N/A	Short periods of supervised tummy time is provided for all infants	1 or 2 times per day	Our program offers 3-5 minutes of tummy time for infants who can't turn over	1 or several times per day
AREA INDOORS	Indoor recreation areas that encourage infants to be physically active? (IOM Rec 3.2)	Our program offers the following in the indoor play space (mark number of features)	2 to 4 features	Our program offers the following in the indoor play space (mark number of features)	2 to 4 features	Indoor space is available: Infants	For all active play activities (eg crawling, walking)	Does your centre have an indoor play area such as a gym or a room for gross motor activity?	Yes	Our program offers the following in the indoor play area	2 or more checked
AREA OUTDOORS	Outdoor recreation areas that encourage infants to be physically active? (IOM Rec 3.2)	Our program uses the outdoors for the following type of activities	2 to 5 activity types	Our program uses the outdoors for the following type of activities	2 to 5 activity types	Outdoor play space includes: Infants	Plenty of play space to move around and explore	Does your centre have an outdoor play area such as a playground?	Yes	Our program uses the outdoors for the following types of activities	2 or more checked
LIMIT EQUIPMENT	Limitation to the use of equipment such as strollers, swings, bouncer seats/chairs for holding infants while they are awake? (IOM Rec 3.3)	Outside nap and meal times, the longest that infants spend in seats, swings, or exersaucers at any one time is	Never	Outside nap and meal times, the longest that infants spend in seats, swings, or exersaucers at any one time is	Never	Infants participate in seated or non-active play activities (excluding naps/meals) for more than 30 minutes at a time	Never	Infants are placed in a bouncy seat, swing, or play pen for more than 15 minutes at a time	Never	Outside of nap and meal times, the longest spent in seats, swings, or ExcerSaucers at any one time is	Never
STAFF TRAINING	Training to staff in ways to increase children's physical activity? (IOM Rec 3.4)	Teachers and staff receive professional development on children's physical activity	1 to 2 times per year	Teachers and staff receive professional development on children's physical activity	1 to 2 times per year	Training opportunities are provided to staff in physical activity and/or gross motor development (not including playground safety)	1 to 2 times per year	Training is provided for staff on promoting infant movement	1 to 2 times per year	Teachers and staff receive professional development or continuing education on children's gross motor activity	1 to 2 times per year
FAMILY EDUCATION	Education to families (who have children enrolled) about children's physical activity? (IOM Rec 3.4)	Families are offered education on children's physical activity	1 to 2 times per year	Families are offered education on children's physical activity	1 to 2 times per year	Physical activity and/or gross motor development education is offered to parents	1 to 2 times per year	Active play education (workshops and activities) is offered to parents	1 to 2 times per year	Families are offered education on children's gross motor activity	1 to 2 times per year

						through workshops, activities or take home materials					
NO SCREEN	Discouragement of screen media exposure for children < 2 years of age? (AAP rec)	For children under 2 years of age, the amount of screen time allowed in our program each week is	No screen time allowed	For children under 2 years of age, the amount of screen time allowed in our program each week is	No screen time allowed	Can children watch TV/videos/DVDs, play video games or use a computer at your daycare? Infants	No to all	Infants and toddlers are allowed to watch or allowed to access TV/DVDs/videos viewed by older children or adults	Never	The amount of screen time provided in our program or used during feeding each week is: Infants	No screen time allowed

407 [a]Australian Early Start Baseline (2014 to 2017)
408 [b]Australian Standing Preschools Project (2013)
409 [c]Canadian Healthy Living Habits in Pre-school Children study (2011)
410 [d]United States Baby NAP SACC trial (2008)
411 [e]United States Baby NAP SACC trial (2013 to 2017)
412

413

Table 3: Percentage compliance with infant 2011 IOM^ physical activity and 2013 AAP screen time recommendations

	Recommendation: Does this centre provide…	All (%) n= 107	Australia (%) n= 31	Canada (%) n=14	United States (%) n= 62
INDOOR ***P=0.001*** ***X^2=14.910*** ***df=2***	Daily opportunities for infants to move freely under adult supervision to explore their indoor environment? (IOM Rec 3.1)	79	100	50	76
OUTDOOR ***P=0.000*** ***X^2=25.737*** ***df=2***	Daily opportunities for infants to move freely under adult supervision to explore their outdoor environment? (IOM Rec 3.1)	62	86	100	41
GROUND ***P=0.091*** ***X^2=4.797*** ***df=2***	Staff who engage with infants on the ground each day to optimize adult-infant interactions? (IOM Rec 3.1)	63	46	71	70
TUMMY ***P=0.000*** ***X^2=14.760*** ***df=1***	Staff who provide daily 'tummy time' for infants less than 6 months of age? (IOM Rec 3.1)	91.5*	75	No suitable question	100
AREA INDOORS ***P=0.000*** ***X^2=18.266*** ***df=2***	Indoor recreation areas that encourage infants to be physically active? (IOM Rec 3.2)	74	100	86	58
AREA OUTDOORS ***P=0.373*** ***X^2=1.970*** ***df=2***	Outdoor recreation areas that encourage infants to be physically active? (IOM Rec 3.2)	95	100	93	93
LIMIT EQUIPMENT ***P=0.014*** ***X^2=8.477*** ***df=2***	Limitation to the use of equipment such as strollers, swings, bouncer seats/chairs for holding infants while they are awake? (IOM Rec 3.3)	38	50	62	26
STAFF TRAINING ***P=0.041*** ***X^2=6.388*** ***df=2***	Training to staff in ways to increase children's physical activity? (IOM Rec 3.4)	63	79	39	61
FAMILY EDUCATION ***P=0.000*** ***X^2=19.809*** ***df=2***	Education to families (who have children enrolled) about children's physical activity? (IOM Rec 3.4)	41	75	39	25
NO SCREENS ***P=0.364*** ***X^2=2.022*** ***df=2***	Discouragement of screen media exposure for children < 2 years of age? (AAP rec)	80	71	83	84

*Data from Australia and United States only
Note: Missing data not included
^IOM, from 2015, known as the National Academy of Medicine

Table 4. Baseline characteristics of the 107 child care centres with infants who participated in the Early Start Baseline, Standing Preschools Project, Healthy Living Trial and Baby NAP SACC trials from 2008 – 2017

Baseline characteristic	All N= 107	Australia N=31	Canada N=14	United States N=62
Survey completed by the director	102	26	14	62
Survey completed by an educator	5	5	0	0
Date survey completed (range)	2008 to 2017	2013 to 2017	2011	2008 to 2017
Hours of operation (range)	6.30 am to 12:00 midnight	6.30 am to 6.30pm	6.30 am to 6.30 pm	6.30 am to 12:00 midnight
Average number of children per centre	66	67	44	88
Average number of infants per centre	10	14 *	7	9
Year started operating as a child care centre (range)	1969 to 2014	1986 to 2014	1969 to 2010	1986 to 2008[#]
Teachers who have a diploma/certificate or degree (mean percentage)	93.5%	100%	87%	No suitable question
Child care centres located in an urban area (mean percentage)	83%	63%	85%	100%
Socio-economic status (% high;medium;low)	25;24;50	7;26;67	8;33;58[~]	59;12;24[+]

* Standing preschools data only. No suitable question in early start baseline data

[#] 2008 Baby NAP SACC data only. No suitable question from 2013 to 2017 Baby NAP SACC data

[~] From urban child care centres only

[+] 4.4% data missing